

Non-compliance Behavior in Contact Lens Wear and Care among University Students

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Abstract

Non-compliance in contact lens wear poses risks for microbial infection. Understanding the scope and extent of non-compliance behaviour is vital for eye care practitioners in deciding which aspect of lens care is critical when consulting patients. A survey was done to assess the level and scope of non-compliance behaviour among 66 young contact lens wearers. Overall, more than half of the participants (52%) did not comply with lens wear and care regimens. The most non-compliant behaviour was the lens cleaning procedure (59%). Eye care practitioners need to establish creative guidelines to improve compliance among the young lens wearers.

Keywords: Contact lens; Compliance; Students; Lens care

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1.0 Introduction

Correcting refractive errors using a soft contact lens is a popular choice as it is easy to handle and comfortable to wear. With new technology, the contact lenses industry revolutionized, transforming its design and functions. The invention of colour contact lenses and its existence in the market created a new trend among young individuals into using contact lenses for fashion or for enhancing their physical appearance (Alasiri et al., 2015). Regardless of wearing contact lenses for fashion or as a substitution of spectacle correction, a proper fitting and regular examination by qualified eye care professionals are vital with every contact lens purchase. However, many young individuals bypass this process as they were attracted to buy cheaper contact lenses online, in beauty centres, night market, and mall kiosks from unqualified individuals and illegal vendors (Cope et al., 2017; Mohd-Ali & Tan, 2019; Wu et al., 2010). Buying these lenses are a major concern for eye care practitioners as those who obtained contact lenses from said platforms are less likely to acquire appropriate instructions on proper lens wear and care and consequently pose a risk of infection and complications. Previous studies cited an increased risk of the most severe sight-threatening condition, the contact lens-related microbial keratitis with non-compliance behaviour in contact lens practice (Ismail et al., 2012; Morgan et al., 2011). In Malaysia, 85.1% of contact lens users who were treated for microbial keratitis were found to be non-compliant in the lens care procedure (Ismail et al., 2012). Given the safety concerns arising from the non-compliance behaviour among lens wearers, the need to understand the causes for non-compliance behaviour and the scope of non-compliance related to the care and maintenance of contact lenses in a local community is crucial in finding strategies to address the problem.

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2.0 Literature Review

Numerous studies previously have evaluated the level of compliance in contact lens wear and care and further investigated the area of non-compliance behaviour among lens users (Bhandari & Rou, 2012; Bui et al., 2010; Claydon & Efron, 1994; Gyawali et al., 2014; Michael & Patient, 1986; Noushad et al., 2012). In university-based studies which ascertain the knowledge and practice among young contact lens wearers, the level of compliance was observed to be low despite the awareness of the risks of complications from improper lens wear and care (Purushottam A. Giri, Waman M. Chavan, Deepak B. Phalke, 2012; Tajunisah, Reddy SC, 2008). Bui et al. (2010) in their study assessed the relationship between the perceived and actual level of compliance among contact lens wearers and found that only small percentage of the wearers were truly compliant to lens wear and care practice compared to what they initially perceived. They also identified that younger wearers were more likely to be non-compliant, although they were aware of the risk associated with negative behaviour. Cope et al., (2017) reported that 85% of adolescents and 81% of young adults have at least one lens hygiene behaviour that poses a risk for a lens-related eye infection. The most frequently reported risk behaviours among the young adults were lens and casing replacement, while adolescents tend not to visit an eye care practitioner annually.

In the contact lens field, compliance includes several aspects of the care and maintenance regime, such as lens disinfection and rinsing, lens case care, recommended lens wear and replacement period, attendance of aftercare appointments and several other hygiene suggestions such as hand washing. Two university-based studies revealed that the most non-compliant behaviour among the undergraduate contact lens wearers was poor lens case hygiene (Bhandari & Rou, 2012; Noushad et al., 2012). Unaware of aftercare appointment was additionally listed as among the non-compliant behaviours. Online purchase of contact lenses is suggested to be linked to the disregard of the substantial aftercare visits among the wearers (Wu et al., 2010).

The assessment of compliance behaviour of contact lens wearers can be done via several methods such as self-reported questionnaire, interview, demonstration and observation (Claydon & Efron, 1994). Previous studies, however, mainly used self-reported questionnaires for assessing all aspects of compliance in contact lens wear and care. A potential problem with a self-reported questionnaire for assessing compliance, particularly in the aspect of lens cleaning is it may record responses subjected to the wearers' perspective rather than reflecting the wearers' actual behaviour in cleaning. Claydon & Efron (1994) suggested a combination of different assessments to obtain the most accurate estimate of the level of non-compliance. Based on that proposition, a mixed methodological approach was used in this study to investigate the degree of compliance and to identify further the scope of non-compliance behaviour amongst contact lens wearers. A self-reported questionnaire was employed to assess compliance in the aspect of wearing and replacement habits and care of lens accessories, whereas a structured observation was used to assess the lens cleaning procedures.

3.0 Methodology

3.1 Materials of the study

The level of compliance and the scope of non-compliance behaviour in the aspect of wearing and replacement habits, lens cleaning procedures, and care of lens accessories were evaluated using a questionnaire and structured observation in cross-sectional study design.

3.2 Assessment by Questionnaire

The questionnaire was adopted from the previous study by Noushad et al., (2012) that surveyed the rate of compliance with the lens care and maintenance procedures. The original set of questionnaire focus on three significant aspects of lens care procedures, including the wearing and replacement habits, lens cleaning and disinfecting, and care of lens accessories. Originally in English, the questionnaire was translated into the Malay language to suit the targeted participants. Several items in the questionnaire were revised accordingly, and three lecturers from the optometry department validated the revised questionnaire. A draft version of the survey was pilot-tested on five contact lens wearers who were not included in the sample to ensure clarity of the questions. The final questionnaire consisted of 29 questions divided into three sections; (A) the demographics, (B) perceived compliance, (C) contact lens details, (D) wearing and replacement habits, and (E) care of lens accessories. Section A, B and C comprised of closed-ended questions in a multiple-choice format. The response for each question in Section D and E was graded using a rating scale from one to four, which, 4 is always, three is often, two is sometimes, and one is never. Subjects were asked to grade themselves for each question, and before completing the questionnaire, they were informed not to give a score of more than two if they did not carry out that particular procedure at least half of the time. For each answer, a score of three and four will be defined as compliant while the score of one and two was non-compliant. For the negative questions in the questionnaire, the subjects who answer 'never' or 'sometimes' was scored as compliant, whereas "often" and 'always' indicated non-compliant.

3.3 Assessment by Structured Observation

A set of an observational checklist was used to assess compliance on lens cleaning and disinfecting procedures. The checklist includes items adopted from the study by Noushad et al., (2012). This method was used because it discovers whether a participant able to perform the cleaning regimen correctly to reflect their actual practice, rather than what they think is ideal. The checklist consisted of nine steps of the lens cleaning and disinfecting procedures, each assigned with 'Yes' and 'No' boxes. The participants were instructed to demonstrate their routine in lens cleaning and disinfecting procedures, where the researcher used the checklist during observation. The 'Yes' boxes were marked by the researcher when the participant demonstrated correct techniques, while the 'No' boxes were marked

either when the participant performed the techniques incorrectly or when not demonstrated. A score of 4 (compliant) was indicated for 'YES' box and score of 1 (non-compliant) was indicated for 'NO' box.

3.4 Procedures

The questionnaires were administered to a total of 66 contact lens wearers attending UiTM contact lens clinic from January to April 2016. The questionnaire was self-administered, and after completing the questionnaire, the participants demonstrated their lens cleaning and disinfecting practice. In order to promote the participant's honesty, the participants have their questionnaire sealed in an envelope and returned after the demonstration has completed. Participants excluded from the study were those wearing therapeutic contact lenses and daily disposable. Ethics approval was obtained from the UiTM Research Ethics Committee.

3.5 Data analysis

Statistical analysis using the SPSS statistical software program (SPSS 21.0) was performed. Descriptive statistics were computed. The level of compliance was calculated for all three categories, and the overall level of compliance was further assessed. Those who gained a score of three or more in all the three categories were considered as compliant wearers. The chi-square test was done at $\alpha=0.05$ significance level to assess the association between compliance in aftercare visits and the location of contact lens purchase and the association between compliance in lens rubbing and access to lens care information.

4.0 Findings

4.1 Patient characteristics

A total of 66 contact lens wearer predominantly females ($n=61$) with mean age of 22.1 ± 1.33 years, ranging from 20 to 25 years participated in this study. Majority of the participants in the current study was degree students (87.9%) while the rests were diploma (10.6%) and postgraduate (1.5%) respectively. There was a balanced proportion of participants from health science (51.5%) and non-health science (48.5%) academic stream.

4.2 Contact lens details

A majority of participants (62%) wore contact lenses for less than five days a week, and 27% wore contact lenses for more than 8 hours a day. Fifty-six per cent of the participants wore monthly disposable contact lens, 42% wore three months disposable lens and 2% were conventional lenses. Majority of the participants in this study (88%) had worn contact lens for more than six months, thus were experienced wearers. A majority of participants wore contact lens mainly for refractive correction while 26% wore for cosmetic purpose. Only 2% of the participants used contact lenses for sport.

Majority of the participants (79%) reported that they purchased their contact lenses over the counter from optical outlets, 15% obtained their lenses from optometrists and 5% from online sources. Slightly more than half (53%) of the participants claimed they acquired information about contact lens wear and care, while the rest of the participants did not get any information. Figure 1 summarized the location of contact lens purchase and the sources of information that were accessed by the participants. Participants who purchased their contact lens over the counter from optical outlets were those whom many did not get any information about lens wear and care (33%). Only a few get information directly from an optometrist (5%).

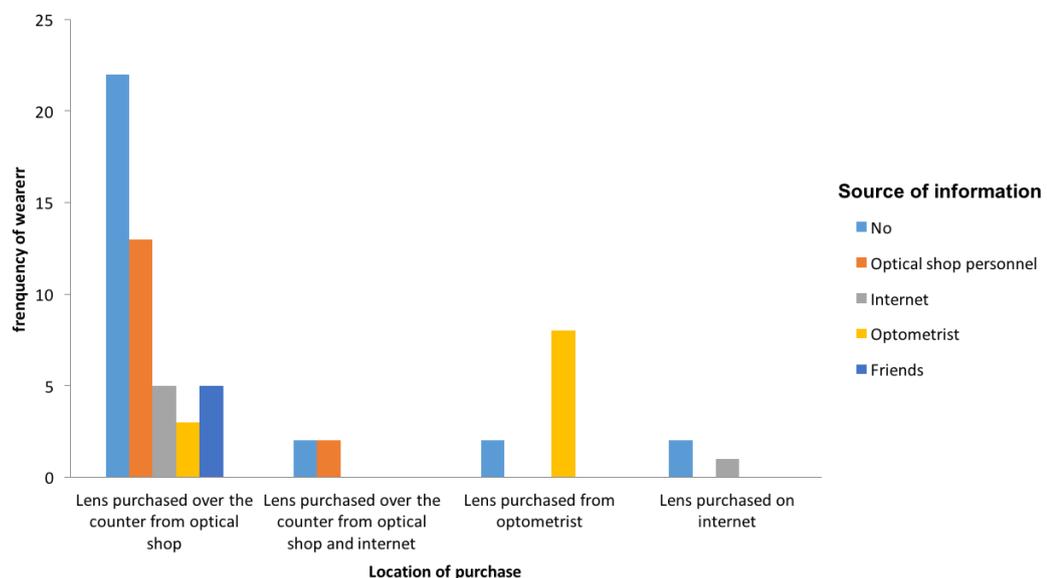


Fig. 1: Source of information on lens wear and care and the location of purchase

4.3 Perceived versus Actual compliance

Figure 2 shows how the participants perceived their compliance as a wearer. Almost half of the participants (47%) were not sure whether they are a good contact lens wearer. There were 35% of the participants perceived themselves as a good wearer, and only 18% of participants perceived themselves as not a good wearer. When the actual overall level of compliance was calculated in all aspect, slightly more than half (52%) of the participants obtained a compliance score of less than 3, thus were identified as non-compliant contact lens wearer. The most non-compliance behaviour among the three aspects was the lens cleaning procedures (Table 1). The actual level of compliance of the participants was compared with their perceived compliance. Of the 35% of participants who perceived themselves as compliant lens wearers, only half (n=12) exhibited as good contact lens wearers. Half of the participants who initially were not sure whether they are compliant wearer displayed non-compliant behaviour (n=16).

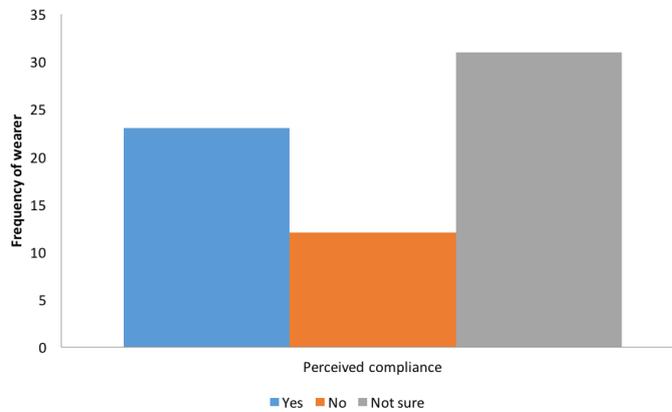
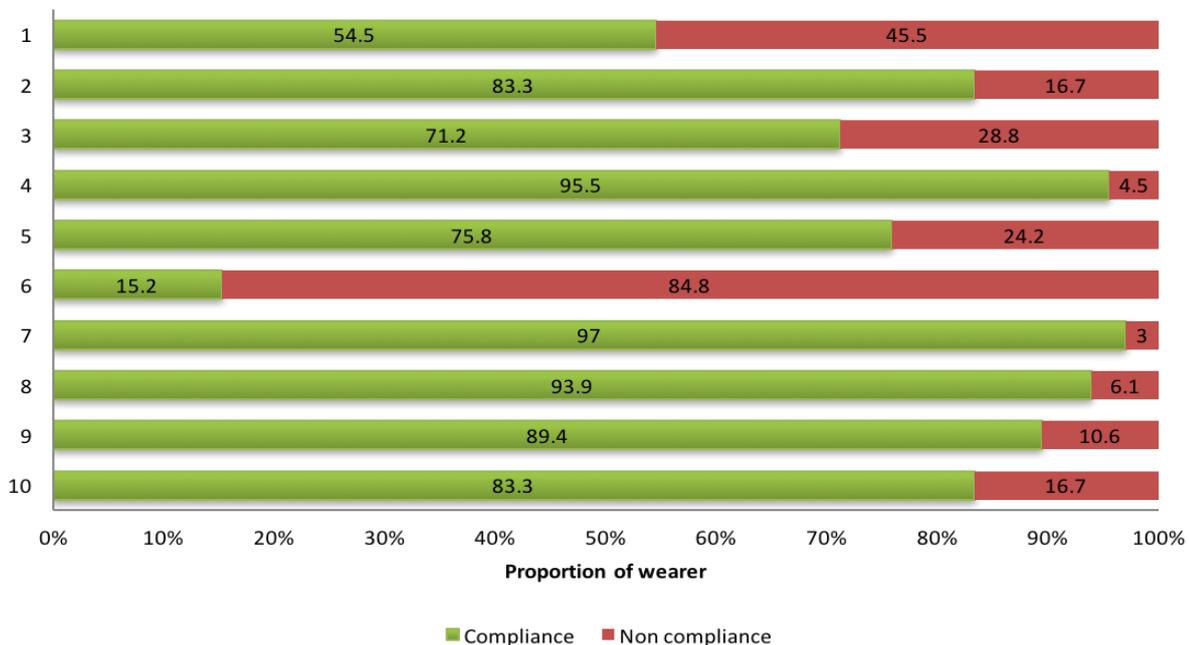


Fig. 2: Perceived compliance

Table 1: Compliance data in each lens care categories

Categories	Wearing and replacement habits	Care of lens accessories	Cleaning and disinfecting procedure
Mean (SD) compliance score	3.218 ± 0.501	2.972 ± 0.629	2.687 ± 0.584
Status of compliance (≥ 3)	82 %	52 %	41%

4.4 Assessments of compliance

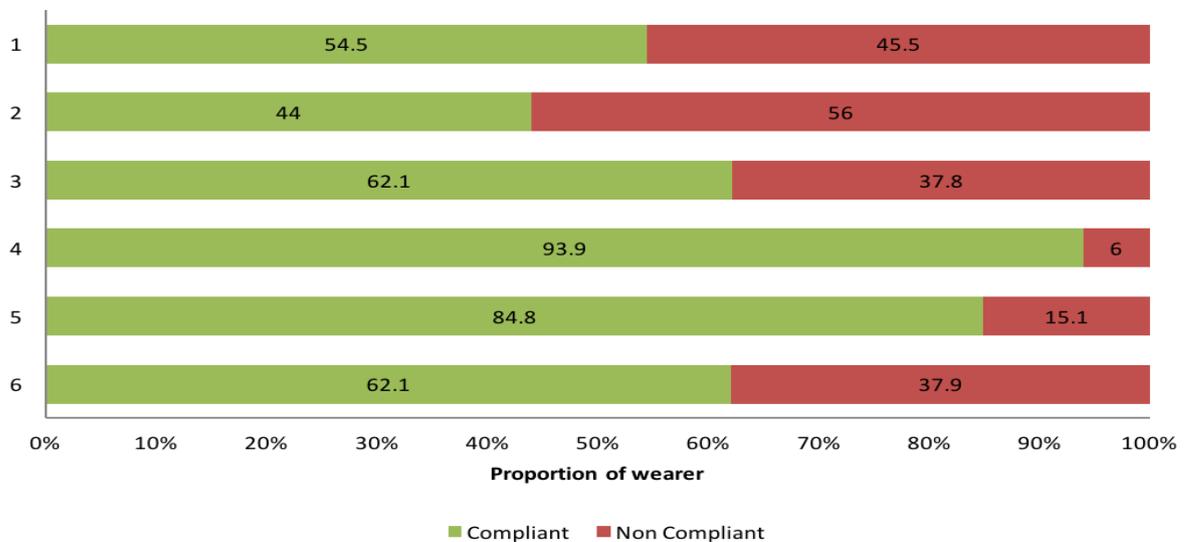


1. I wear my lenses as per the recommended wearing time each day.
2. I discard my used contact lenses and switch to a new pair as recommended.
3. I do nap (sleeping for short periods) in my contact lenses.
4. I sleep overnight in my contact lenses.
5. If my eyes look red or irritated, I remove my lenses as soon as possible.
6. I attend all the recommended aftercare visits suggested by my optometrist.
7. I use tap water to clean my lenses if no solution is available.
8. I swim with contact lenses without any goggle.
9. I store my contact lens in the bathroom.
10. I use fresh solution to store the contact lens after each use.

Fig. 3: Status of compliance in lens wear and replacement habits

The evaluation of lens wear and replacement habits showed the highest level of compliance (82%) (Table 1). However, not attending aftercare visits was observed to be the most non-compliance behaviour exhibited (85%). Other non-compliance behaviours include not wearing lenses according to the recommended wearing time (45%), napped with contact lens on (29%) and did not remove lenses immediately when eyes were irritated or turn red (24%) (Figure 3). A Fisher's Exact test revealed a statistically significant association between the location of contact lens purchase and attendance for aftercare assessment ($p=0.04$).

The assessment of lens case hygiene showed that 56% of the participants did not air-dry their contact lens case every day after inserting the lenses and 46% did not have a routine to clean their contact lens case thoroughly with antiseptic solution or soap and let it air dry once a week (Figure 4). Other non-compliance behaviours include not replacing their lens case every three months (38%) and did not check the 'discard after' dates of their contact lens solutions (38%). Of the 66 participants in this study, slightly more than half (52%) managed to get a compliant score of ≥ 3 in the aspect of care of lens accessories (Table 1).

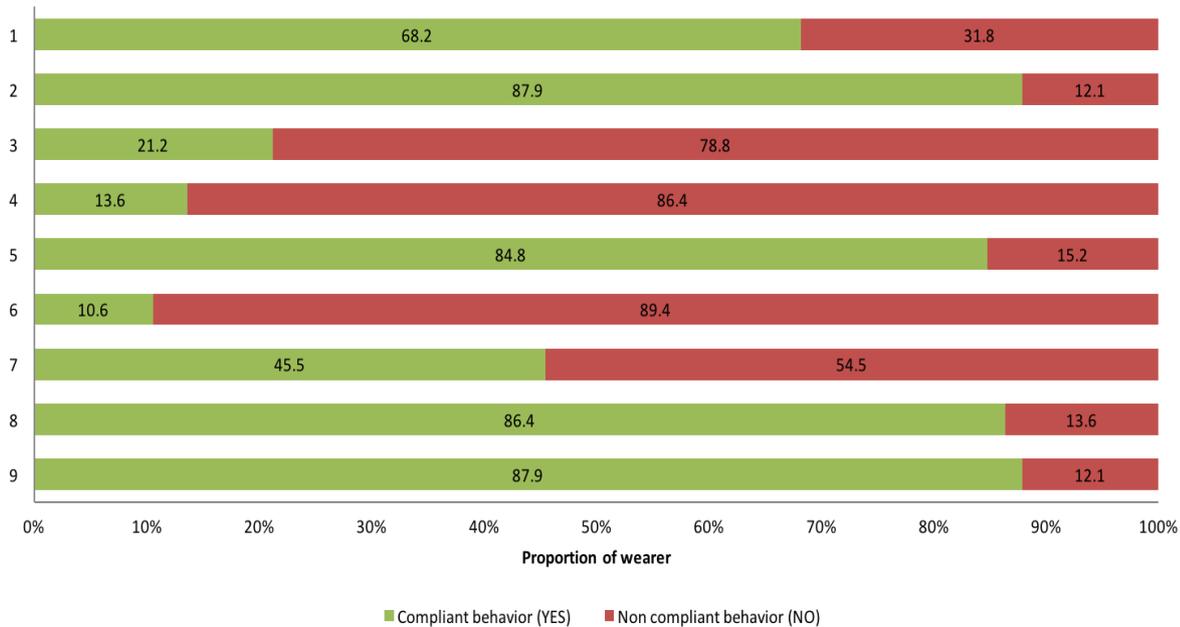


1. I clean my contact lens case thoroughly with antiseptic solution/soap and air-dry it once a week.
2. I allow the lens case to air-dry each time after inserting my lenses.
3. I replace the contact lens case every 3 months.
4. I share my contact lens case with others.
5. I recap my solution bottle immediately after use.
6. I always check the 'discard-after' dates of my contact lens solutions.

Fig. 4: Status of compliance in care of lens accessories

The participants were the least compliance in lens cleaning procedures (Table 1). Majority of the participants did not rinse their lenses before lens insertion (89%) and after the lens cleaning before storage (86%) (Figure 5). There were 79% of the participants failed to clean and disinfect their lenses correctly as many did not rub their lenses during the lens cleaning. A chi-square test revealed no significant association between access of information and contact lens rubbing ($p=0.06$). However, most participants who do not get any information regarding contact lens wear and care were those who did not rub their lenses when cleaning. More than half (55%) did not

check their lenses for debris or damage before lens insertion onto their eyes. Additionally, 32% of the participants did not wash their hands with soap and dry it before handling the contact lens.



1. Wash hands with soap and dry it before handling contact lenses.
2. Clean contact lenses with suitable solution (eg: MPS) after lens removal.
3. Using rub technique with solution on both sides when cleaning.
4. Rinse lens after cleaning.
5. Fill lens case with adequate disinfecting solution until contact lens is fully immersed.
6. Rinse lens before lens insertion.
7. Check lenses for debris and damage before lens insertion.
8. Use fresh solution to store/soak lenses each use.
9. Recap solution bottle every time after use.

Fig. 5: Status of compliance in lens cleaning and disinfecting procedure

5.0 Discussion

The results of this study showed an overall of 52% of university students were non-compliant with lens wear and care. This rate was slightly lower than the non-compliance rate in other university-based studies (Noushad et al., 2012; Tajunisah, Reddy SC, 2008). The level of compliance in this study was evaluated for three aspects which include wearing and replacement habits, care of accessories and cleaning and disinfecting procedure. Of the three aspects, the lens cleaning and disinfecting procedure were the most non-compliant behaviour exhibited by the studied participants. In contrast, Noushad et al., (2012) reported that cleaning and disinfecting behaviour was the highest level of compliance in their studied participants. Bhandari & Rou, (2012) similarly reported a low level of non-compliance in this aspect despite having the same demographic background as the current study. The difference between the current and the two studies may be attributed to the different approach in assessing the lens cleaning procedures. The study by Noushad et al., (2012) used a self-reported questionnaire alone to evaluate the compliance in cleaning procedures with each procedure was scored based on the frequency their participants claimed to have performed the procedure. In this way, the level of non-compliance in this aspect was probably underestimated as the participants may become more aware of their behaviour and answered according to what they believe they did rather than their actual practice in their routine cleaning techniques (Claydon & Efron, 1994).

Among the non-compliant practices that were observed in the lens cleaning procedure include not rubbing the lenses when cleaning (79%), not rinsing the lenses before insertion (89%) and storage (86%). A high rate of non-compliance to lens rubbing and rinsing was similarly observed in an international study which observed an 80% of the wearers did not perform this procedure (Morgan et al., 2011). The presence of no-rub solution in the market may have caused the lack of rubbing and rinsing among contact lens wearers (Noushad et al., 2012). However, this was not conclusive within this study as information on the lens solution brands used by the studied participants was not obtained. A possible explanation for the poor lens cleaning technique in this study might be because many of them (47%) did not receive any information on lens cleaning and care. As lack of rubbing and rinsing lenses have been demonstrated to lead to Fusarium Keratitis (Ahearn & Doyle Stulting, 2014), lens wearers must adhere to this practice.

The second most non-compliant behaviour was in the aspect of lens case hygiene (48%). Among the shortcomings were not cleaning the contact lens case thoroughly, did not allow the lens case to air dry and did not replace the lens case every three months. The rate in the present study was similarly reported in a previous study in Malaysia, where 46% were non-compliant in lens case care (Bhandari

& Rou, 2012). The emphasis on lens case hygiene is usually given during the aftercare visits. However, Wu et al., (2010) reported that the frequency of aftercare visits had no significant effect on the practice of lens case hygiene due to unavailability of standard guideline for lens case cleaning by practitioners.

The aftercare assessment is vital as it permits early detection of any ocular physiological changes and provides an opportunity to review lens wearers compliance (Wu et al., 2010). In our study, only 15.2% of participants attended the aftercare assessment, a comparable value with a previous study (28%) also done in Malaysia (Bhandari & Rou, 2012). A better frequency in aftercare visits was observed in other countries such as Saudi Arabia (Kumar & Yousef, 2013) and India (Noushad et al., 2012), where more than half (62%) and less than half (44%) of lens wearers attended the aftercare visits respectively. In general, the low percentage of aftercare visits in Malaysia is probably attributed to the source of lens purchase where a majority of the wearers (n= 53) bought their lenses over the counter from non-certified personnel working in optical shops. Those wearers may eventually not well informed on the importance of aftercare visits, thus resulting in a lack of attendance.

Limitations in this study include small sample size, and the scope of non-compliance did not represent a working or school population. The findings are also less generalizable to the population with a different culture or demographic setting.

6.0 Conclusion and Recommendations

This study demonstrates that young contact lens wearers did not fully adhere to the lens care regimens, especially in lens cleaning and lens case hygiene. Present findings provide insightful knowledge to eye care practitioners on what aspect in lens care and maintenance that needs to be emphasized when consulting their young patients. Eye care practitioners might need to establish a standard instructional guideline on lens cleaning and lens case hygiene using a creative and innovative medium in targeting improves compliance among young patients. Future studies may investigate the level and scope of non-compliance among teenagers in a multiracial setting or different demographic.

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